

## CLAIMS

What is claimed is:

- 1) A method for defining attributes of polygon border tiles, comprising:
  - decomposing a polygon into a plurality of segments;
  - decomposing the segments into a plurality of border tiles;
  - designating at least one edge for each border tile;
  - determining a spatial relationship between the designated edge of each border tile and the polygon; and
  - generating the attributes of the border tiles based on the spatial relationship between the designated edge of each border tile and the polygon.
- 2) The method of claim 1 wherein generating the attributes further comprises:
  - generating a first attribute if the designated edge of the border tile crosses the polygon;
  - generating a second attribute if the designated edge of the border tile is disposed completely within the polygon; and
  - generating a third attribute if the designated edge of the border tile is disposed completely outside the polygon.
- 3) The method of claim 2 wherein the first, second, and third attributes are different from each other.
- 4) The method of claim 1 wherein designating at least one edge for each border tile further comprises designating an eastern edge for each border tile.
- 5) The method of claim 1 wherein designating at least one edge for each border tile further comprises designating the same edge for each of the plurality of border tiles.

6) The method of claim 1 wherein determining a spatial relationship between the designated edge of each border tile and the polygon further comprises determining if the designated edge of a border tile is within an interior space of the polygon.

7) The method of claim 1 further comprising:

designating the segments as vectors that traverse in a clockwise direction around a border of the polygon;

determining an attribute of a border tile based on a proximity of one of the vectors to one of the edges of a border tile and based on a direction of the one of the vectors through the border tile.

8) The method of claim 1 further comprising decomposing multiple segments through a single border tile.

9) A computer-readable medium having computer-readable program code embodied therein for causing a computer system to perform:

defining a polygon having a border that is non-self-intersecting and formed of a plurality of segments on a grid of tiles;

defining, from the grid of tiles, a plurality of border tiles that intersect the segments; and

generating an attribute associated with at least one edge of a border tile, wherein the attribute is selected from the group consisting of: the at least one edge crossing a segment, the at least one edge disposed completely within the polygon, and the at least one edge disposed completely outside the polygon.

10) The computer-readable medium of claim 9 wherein the attribute can be modified on at least two different occasions for the same border tile.

11) The computer-readable medium of claim 9 wherein the attribute is set to a first condition and then re-evaluated and set to a second condition if multiple segments pass through the same border tile.

12) The computer-readable medium of claim 9 wherein the attribute is associated with an eastern edge of the border tile.

13) The computer-readable medium of claim 9 having computer-readable program code embodied therein for causing the computer system to further perform converting the polygon to a non-self-intersecting chain-code wherein at least one segment passes twice through the same border tile.

14) The computer-readable medium of claim 9 having computer-readable program code embodied therein for causing the computer system to further perform:

defining a y-axis through a border tile;

generating an attribute based on a proximity of a segment through the y-axis.

15) The computer-readable medium of claim 14 wherein generating an attribute further comprises comparing proximities of two different segments through the y-axis.

16) A computer system comprising:

a processor; and

memory having computer readable code executable by the processor for:

decomposing a polygon into plural segments on a grid of tiles;

identifying a first border tile having an edge, the first border tile intersecting at least one of the segments; and

identifying a spatial relationship between the edge and the polygon to define an attribute of the first border tile with respect to the polygon, the spatial relationship being one of: (1) the at least one segment crossing the edge, (2) the edge being located within the polygon, and (3) the edge being located outside the polygon.

- 17) The computer system of claim 16 wherein the plural segments are non-self-intersecting.
- 18) The computer system of claim 16 further comprising computer readable code executable by the processor for identifying a spatial relationship between a direction of the at least one segment through the first border tile to define an attribute of the first border tile.
- 19) The computer system of claim 16 further comprising computer readable code executable by the processor for defining a horizontal axis through the first border tile and identifying a spatial relationship between the at least one segment and the horizontal axis to define an attribute.
- 20) The method of claim 19 wherein the at least one segment crosses the horizontal axis to generate a first attribute and does not cross the horizontal axis to generate a second attribute different than the first attribute.